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Storing of Seed Cotton

as an Aid to More Efficient Ginning
and Marketing

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PREFACE

This project was initiated to determine the effects of mechanical harvesting on the ginning business. Ginning capacity at the peak of hand harvesting has frequently been inadequate to keep up with the rate of harvesting.

As the shift from hand to mechanical harvesting increases, the length of the harvesting season will inevitably be shortened. The length of the ginning period for currently harvested cotton will be shortened in like proportion. Thus, the balance which has been established over the years between the size of the cotton crop and its rate of harvesting and ginning capacity will be disturbed.

Three solutions seem to present themselves, singly or in combination, as the means of fitting the pattern of ginning to the pattern of mechanical harvesting: (1) increase the ginning capacity to compensate for the shortening of the harvesting period; (2) increase the number of days of full-run 24-hour ginning; and (3) the storing of seed cotton for ginning after the close of the harvesting season, or after the peak of the harvest.

This bulletin gives information on three methods of storing when the rate of harvesting exceeds current gin capacity. These are: (1) storage in seed-cotton houses at gins, (2) storage in the field on farms and (3) storage in farm buildings.

The study was confined largely to the High Plains since mechanical stripping has been adopted extensively in this area. Field storage studies were in this area.

Storage in seed-cotton houses was studied in the Gulf Coast area. Records for 3 years covering a large gin seed-cotton house were available.

A mail survey of ginneries over the State early in 1950 indicated that 50 percent have had no experience in ginning mechanically harvested cotton. The problem of adjusting ginning capacity to the rate of mechanical picking and stripping at peak periods is still in a state of flux except in the High Plains area where field storage of seed cotton has been a satisfactory method of adapting ginning capacity to mechanical stripping.

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Storing of Seed Cotton

as an Aid to More Efficient Ginning and Marketing

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BEFORE the invention of the saw gin, cotton production in the United States was limited by the amount of lint and seed that could be separated on the roller gin and by hand. Whitney's gin and subsequent improvements largely removed this limitation. However, for a while, cotton production increased more rapidly than the ginning capacity. The planters soon established a balance between the production and ginning of cotton. The use of slave labor permitted continuous picking of the crop until all the cotton was removed from the fields, and its ginning became a task for the winter days when the slave would have otherwise been idle.

After the Civil War, the small planters, tenants and share croppers found it to be more economical to gin at commercial gins rather than to try to operate a gin of their own. Many cotton producers had small seed cotton storage houses in the fields in which seed cotton was stored and then hauled to the gin at convenient times. At the same time, planters found it reduced the labor cost to gin the cotton as the picking progressed.

With the advent of the modern gin, a balance was established between the rate of harvesting and the rate of ginning. The cotton was ginned at about the same rate that it was harvested.

Stripping of cotton was tried on the High Plains as early as 1914. The first animal-drawn commercial strippers were introduced to help with the harvest of the large 1926 crop. These strippers were made by local blacksmiths and farmers. A few one and two-row tractor-mounted strippers were built in 1930. At that time, labor was plentiful and cheap. There was little incentive to use these rather crude strippers. They stripped off the entire boll and fragments of the stalk. Thus, the task of separating the lint from the foreign matter was forced on the gin. Tractor-mounted strippers began to be used on a fairly large scale in 1944, after a period of almost no interest in strippers on the part of both the farmer and industry during the depression years of the 1930's.

Today, the ginning industry is faced with a situation which threatens this balance. Two men and a tractor-mounted stripper

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can harvest as many as 10 bales of cotton a day. Thus, as much cotton can be harvested with a stripper as 47 men can harvest by hand. (Based on one man snapping 400 pounds of cotton a day and a 500-pound bale of lint requiring 1,900 pounds of seed cotton.) On the High Plains, where the stripper is now used extensively, mechanical stripping usually is delayed until after frost. Gins in this area nearly always have a surplus of seed cotton on their yards during the peak of harvesting. With fair weather, the cotton crop can be stripped within a 30-day period. A gin, having a 24-hour capacity of 120 bales and a volume for the season of 6,000 bales, could gin only 3,600 bales during the harvesting season and would be faced with a surplus of 2,400 bales over its harvesting period capacity.

These 2,400 bales of seed cotton would have to be left on the gin yard, or stored in the seed-cotton house or on the farm, or the ginning facilities would have to be increased to enable the ginning of the entire volume during the 30-day harvesting period.

As the use of mechanical pickers in other areas increases, the gins in such areas will be faced with a surplus of seed cotton on their gin yard throughout the peak of the harvesting season. This situation however, is not expected to be as acute as it will be in the areas where the tractor-mounted strippers are used.

Fitting Pattern of Ginning to Pattern of Mechanical Harvesting

Three solutions seem to present themselves, singly or in combination, as a means of fitting the pattern of ginning to the pattern of mechanical harvesting: (1) increase the ginning capacity to compensate for the shortening of the harvesting period; (2) increase the number of days of full-run 24-hour ginning; and (3) the storing of seed cotton for ginning after the close of the harvesting season. Ginners already in the business are having to add costly drying and cleaning equipment to their plants to give good service on mechanically-harvested cotton. The addition of new gin plants would materially increase the investment in the ginning business and would greatly increase fixed costs of the Texas ginning business as a whole.

The proportionate shortening of the harvesting season with the adoption of mechanical harvesting will not call for a proportionate increase in gin capacity. For Texas as a whole, gin capacity has been adjusted so that the entire crop could be ginned, on an average, in about 24 days of full-run 12-hour day operations. During years of normal cotton yields, or less, the days of full-capacity ginning are relatively few. Full-capacity ginning during the entire harvesting period would compensate in large measure for the shortened period because of mechanical harvesting. The question of fitting ginning to harvesting is as much a matter of insuring full-run 24-hour ginning during the harvesting season as it is of increasing ginning capacity or of storing seed cotton for ginning after the close of harvesting.

Views of Ginners Regarding Effects of Mechanical Harvesting on the Ginning Business

A schedule was mailed to all Texas ginners early in 1950. This schedule sought information on such matters as: experiences in ginning mechanically harvested cotton; number of patrons with mechanical harvesters; listing of patrons with facilities for the storing of seed cotton on their farms; capacity of seed-cotton houses on the gin lots; the use made of the cotton houses during the 1948-49 and 1949-50 seasons; and the nature of the controls exercised over the movement of seed cotton into the cotton house and the selection of the time of ginning out of the cotton house.

Schedules were returned by 340 ginners, or 15 percent of all Texas ginners. The analysis made of the schedules returned should be taken to represent the reporting gins and not all gins. Half of the reporting gins had no experience in the ginning of mechanically harvested cotton.

A summary by areas of the 1951 survey follows:

Lower Rio Grande Valley: Very few ginners have seed-cotton houses. Increased gin capacity, more trailers and maximum use of present gin-capacity were suggested by the ginners to counter the effect of the increased use of mechanical pickers.

Coastal Bend and Gulf Coast: Only a few ginners favored the use of seed-cotton houses; the high operating expense was mentioned. Several ginners said mechanically-picked seed cotton should be dried before storing in a gin seed-cotton house. A few suggested storage of seed cotton on the farm.

Blackland Prairie: Full-run 24-hour capacity was adequate over most of the area. More trailers and storage on the farm would assist in solving the problem as mechanical harvesting increases. A few ginners advocated sheds for trailers and seed-cotton houses.

El Paso Valley: This area had no mechanical pickers and no seed-cotton houses at the gins.

Rolling Plains: Gin capacity is ample in years of normal production. Thirty percent of the reporting ginners suggested storage of seed cotton on the farm prior to ginning. One ginner with a 100-bale seed-cotton house expressed intentions to increase the capacity to 400 bales.

High Plains: Ginners suggested farm storage of seed cotton and an increase in gin capacity.

Very few ginners favor the use of the seed-cotton house at the gin to facilitate the handling of daily harvesting in excess of gin capacity. The most common objection is the fire hazard and the unavailability or prohibitive cost of insurance. The retarded,

more costly rate of ginning out of the house is also a factor. Growers clamor for bin space in the house in order to unload and return trailers to the field when cotton on the gin yard exceeds immediate gin capacity. Those unable to obtain cotton-house space usually feel that available storage is allotted to favorites. Several ginners contend there is no profit on cotton ginned out of the house. One High Plains ginner with a 200-bale house rarely uses it. This gin is a cooperative. The directors and patrons believe that ginning off the yard is more rapid and less costly.

Uses of Seed-cotton House

There are several distinct uses of the seed-cotton house. These are to: (1) permit farmers to save planting seed, (2) enable ginners to buy and accumulate "remnants" in the seed, (3) permit farmers to unload their seed cotton in the house and return trailers to the fields more promptly when the rate of harvesting exceeds ginning capacity, (4) enable ginners to accumulate a backlog of seed cotton to be ginned when the rate of harvesting is below ginning capacity and (5) permit the storage of seed cotton to be ginned after the close of the harvesting period, thereby lengthening the season.

Early Use

The first seed-cotton houses were constructed by ginners to permit the accumulation of several bales of seed cotton by farmers wishing to catch the seed for planting purposes. At this time, the animal-drawn wagons used for hauling seed cotton to the gins usually had a capacity of only one bale. Generally, growers owned only one or two wagons.

When seed cotton is to be ginned to obtain seed for planting purposes, it is necessary to clean the seed rolls of the gin before ginning. If this is not done, the grower saving seed will have seed of the preceding bale mixed with his seed. When ginning cotton off the yard, ginners do not clean the seed rolls between each grower's seed cotton but stop the operation of each stand as the seed cotton ceases dropping from the feeder-cleaners. The use of the seed-cotton house permits the ginning of several bales for planting seed with one cleaning of the seed rolls. Thus, the seed-cotton house was important to facilitate saving of seed for planting during the period when farmers had low capacity wagons.

At the end of the season, growers frequently bring less than bale lots of seed cotton to be ginned. This cotton dribbles in over a period of several weeks. For several days, there may be no receipts. If the ginner gave immediate service, it would necessitate the availability of a full crew. Ginners usually buy such cotton in the seed and operate the gin when a sufficient volume is accumulated or the gin is to be closed for the season. Thus, the ginner

is saved the expense of ginning small lots and the farmer makes satisfactory disposition of his lint and seed.

In many areas, trailer capacity is now two to six bales. Growers having several trailers of this kind can gin three or more loads at a time. If the seed from the first bale of such a lot is not saved for planting purposes, the seed from the following bales do not contain enough foreign seed to be objectionable. A seed-cotton house at the gin is not needed in such instances.

Controls of Seed-cotton House Operations

The controls exercised by ginners and patrons over the movement of seed cotton into and out of the storage houses determine the efficiency of operation. One form of grower control appears in the maneuvering of some patrons to obtain exclusive use of several bins by unloading small amounts of seed cotton in each bin but not enough to fill them to capacity. As a consequence, cotton house capacity is poorly utilized. A ginner may discourage this practice by reserving the right to throw a tarpaulin over the seed cotton already in the bin. This permits putting another grower's seed cotton in the same bin when the demand for storage is urgent. If the grower decides the time of ginning, the ginner is hindered in ginning out of the cotton house whenever slack periods develop. Even when the ginner has control of ginning out of the house, it is difficult to exercise it on seed cotton stored for the purpose of saving planting seed. Usually in such cases, ginning can take place only when the growers are present and prepared to catch the seed. It is not easy for the ginner to exercise complete control of movement into and out of the seed-cotton house and still have the good will of all his patrons.

Recent Use

The cotton house has been used in recent years to permit growers to unload trailers and trucks in order that they might be returned more promptly to the fields. The stored seed cotton is ginned when the gin yard is cleared. Ginners having houses of large capacity make use of them to accumulate cotton for later ginning when the gin is temporarily closed for emergency repairs. In areas where 24-hour ginning for a period of several days or weeks is possible, ginning off the yard in order of arrival is given preference to ginning out of the house. Seed cotton stored at the beginning of such a period frequently remains for several weeks before it is ginned. Price changes during the storage period result in gains on advances in the market and losses during declines.

Rate of Ginning from the Cotton House

One additional handling is involved when ginning out of the seed-cotton house. The cotton must be put in the house with the conventional suction system. In ginning from the cotton house,

the seed cotton is forked to an opening in the floor from which it is drawn into the suction pipe which delivers the seed cotton to the gin. Two or three men are usually required in this operation. One man can direct the flow of seed cotton to the gin more rapidly when ginning from a truck or trailer. When ginning from the house, the rate of flow to the gin is frequently uneven. This often results in inadequate seed cotton for three or four stands and an insufficient or no supply for the fourth or fifth stand. Thus, the gin is not operating at maximum efficiency at all times. The caking or formation of large masses of seed cotton while in storage may contribute to the retarded feeding rate. These masses must be broken into smaller pieces before they can enter the opening to the suction line.

Cost of Cotton-house Operation

Very few ginners separate the cost of the seed-cotton house operation from gin costs. For this reason, it is not possible to determine the cost of storing seed cotton in the house with any degree of accuracy. The following data illustrate the difference in labor costs between ginning off the yard and out of the house, based on one modern 6-80 plant on the High Plains. The ginner stated that when ginning off the yard he could gin 80 bales in a 12-hour run, but when ginning out of the house he could gin only 70 bales.

The labor cost of ginning 80 bales from the yard is \$75, or 94 cents per bale. (Twelve-hour shift; 2 ginners, 1 at \$1.25 per hour and 1 at \$1.00; 2 press men, 1 suction and 1 yardman, all at \$1.00 per hour.) The cost of labor to gin 70 bales from the house in the same time is \$99, or \$1.41 per bale. (Twelve-hour shift; 2 ginners, 1 at \$1.25 per hour and 1 at \$1.00; 2 press men, 1 suction man at time seed cotton went in house and 3 men to regulate the flow out of the house, all at \$1.00 per hour.) The increased labor cost in ginning from the house is 47 cents per bale. The seed cotton flows through the suction line a greater distance at a less rapid rate. This involves increased power requirements over ginning off the yard.

Another cost to be considered is insurance on seed cotton stored in the house. Insurance companies do not quote rates but bargain with each ginner. For many gins the cost is prohibitive.

Of the seed-cotton houses observed, the ginner with the largest storage space had two houses with a total capacity of 760 bales. This gin is in the Gulf Coast area. A record of seed-cotton house operations for 3 years was available. One house had a capacity of 360 bales and the other 400 bales. A summary of storage holdings in the two houses during the 1949 season, from July 5 through November 29, is shown in Table 1. The maximum storage attained was 394 bales. The larger house is adequate for this volume. There were only 25 days when storage exceeded 350 bales and 37 days

Table 1. Pattern of storage, 1949 crop, of a 760-bale capacity seed-cotton house in the Gulf Coast area

Storage in seed-cotton house	
No. of bales	No. of days in storage
0 - 24	20
25 - 49	28
50 - 74	17
75 - 99	8
100 - 124	6
125 - 149	5
150 - 174	2
175 - 199	4
200 - 224	3
225 - 249	1
250 - 274	2
275 - 299	3
300 - 324	6
325 - 349	6
350 - 374	17
375 - 399	8

when it exceeded 300 bales. House capacity, therefore, was almost double maximum use.

The cost of these two buildings was about \$30,000. During the 1949 ginning season, 1,709 bales were ginned from cotton stored in these houses. These houses are used as a basis for approximating depreciation and investment costs. Depreciation at the rate of 2.5 percent per annum on the investment is \$750, or 44 cents per bale.

Interest on investment computed at 6 percent totals \$1,800, or \$1.05 per bale.

The foregoing costs of cotton house operation total \$1.96 a bale exclusive of insurance. This increases the bale cost of ginning from the house and is burdensome to most ginners. Few ginners make a charge for the use and services of the house. Only two of the ginners contacted made a charge for cotton house services. One received 50 cents per bale and the other \$1.00.

Use to Lengthen the Ginning Season

Should the seed-cotton house be used to store cotton in order to lengthen the ginning season as much as 4 weeks, four houses equal in capacity to the two 760-bale houses would be required. The gin has a capacity of 110 bales every 24 hours. The cost of these houses approaches that of a second gin plant. House capacity adequate for continuous ginning for 4 weeks would require the use of considerable gin yard space. The seed cotton would be moved a much greater distance to the gin. Ginning would be at a slower rate with greater power costs. Another gin would probably be more feasible than a single gin with seed cotton storage capacity of 2,000 to 3,000 bales.

Results of Seed-cotton House Operations

There is no evidence to support the assumption that by storing in the seed-cotton house, when there is a surplus of seed cotton on the gin yard, the ginner is able to increase the efficiency of ginning by adjusting the pattern of ginning more advantageously to the pattern of harvesting.

The size of the house and the rate of turnover determine the amount of seed cotton that can be stored in the house. The ginning records of the two largest seed-cotton houses studied indicate that the turnover of seed cotton in the house is low even when there is a surplus of seed cotton on the gin yard. Therefore, the use of the seed-cotton house is primarily limited to its capacity, and the efficiency of operating the gin is not improved to any extent by storing in the seed-cotton house, due to the fact that the seed cotton could be ginned as conveniently off the yard as out of the house. The cost of operating the seed-cotton house is an additional cost to that of ginning the cotton directly off the yard.

As farmers have pointed out, the advantage of the seed-cotton house during peak ginning periods is that seed cotton can be unloaded immediately and trailers and trucks can be returned to the field. However, this does not improve the efficiency of ginning.

Harvesting and Storage on the High Plains, 1949-50

A survey was made in the spring of 1951 to obtain information on the harvesting and storage of the 1949 and 1950 crops. Data were obtained on acreage and production, harvesting methods, ginnings, length of stripping season, storage of seed cotton, trailer capacity and capacity per stripper. The counties surveyed are shown in Table 2.

The survey data were expanded and adjusted on the basis of 1950 Census data of the number of cotton farms and the ginnings

Table 2. Cotton ginned November 14 to end of season, ginnings during stripping period, storage in trailers and number of bales in storage at end of stripping period, eight High Plains counties, 1949 crop

County	Ginned Nov. 14 to end of season	Stripping period		In storage awaiting ginning
		Ginnings	Possible storage in trailers	
Bales				
Cochran	44,329	7,821	2,213	34,295
Crosby	66,881	26,154	4,545	36,182
Dawson	109,948	38,556	4,444	66,948
Hale	81,631	20,655	8,963	52,013
Hockley	109,447	37,944	8,020	63,483
Lamb	130,023	45,198	12,918	71,907
Lubbock	160,416	61,236	11,330	87,850
Lynn	101,813	39,150	5,188	57,475
Total	804,488	276,714	57,621	470,153

Table 3. Assumed capacity of operating strippers, estimated trailer capacity and operating gin capacity, eight High Plains counties, 1949 crop

County	Operating strippers		Trailers		Operating gins	
	Estimated		Estimated		Daily	
	Number	Daily capacity	Number	Capacity	Number	capacity (24-hr. run)
		Bales		Bales		Bales
Cochran	700	5,600	872	2,213	11	990
Crosby	575	4,600	1,739	4,545	20	1,800
Dawson	900	7,200	2,093	4,444	28	2,520
Hale	753	6,024	3,549	8,963	17	1,530
Hockley	1,100	8,800	3,461	8,020	34	3,060
Lamb	1,000	8,000	6,378	12,918	31	2,790
Lubbock	1,060	8,480	4,815	11,330	36	3,240
Lynn	850	6,800	2,444	5,188	29	2,610
Total	6,938	55,504	25,351	57,621	206	18,540

in each of the eight counties surveyed. An analysis of these data was made to correlate the information with existing ginning capacity and an assumed stripper capacity.

Stripping is usually started 8 to 10 days after the first killing frost. For the purpose of comparison, it was assumed that fair weather prevailed and all the 1949 crop in the eight counties was stripped without interruption, after November 13.

The first column of Table 2 indicates the number of bales of seed cotton not ginned as of November 14. Assuming all of this was harvested by the number of strippers of eight bale daily capacity shown in Table 3, then in Cochran county, for example, 7,821 bales would be ginned during the stripping period, 2,213 bales would be in storage in trailers at the end of stripping and 34,295 bales would be in field or other storage awaiting ginning.

Average daily ginnings per gin by ginning periods are shown in Table 4. These data and the stripper, trailer and gin capacities in Table 3 were used in computing the data in Table 2. Should the number of strippers indicated in Table 3 be diminished, the length of the stripping period would be lengthened and the amount of seed cotton in storage at the completion of stripping would be less.

Use of Trailers

Many growers attempt to maintain uninterrupted harvesting by having access to large trailer capacity. This means that capacity sufficient to maintain harvesting at the peak of the ginning period frequently involves ownership or access to trailers having a capacity equal to 3 days harvesting. When the gin is closed for emergency repairs such capacity is temporarily inadequate.

Some High Plains growers have a high investment in trailers. In one community, a grower had 30 trailers with a total capacity of

90 bales of machine-stripped seed cotton. This represents an investment of over \$6,000. It is doubtful if this is justified by the period of about 30 days in which the trailers are used each year. The grower on an adjoining farm had a much smaller investment in trailers, 10 valued at \$1,700, with a capacity of 30 bales. He stores part of his seed cotton in the field between the time of stripping and ginning. He has \$700 invested in a hay-stacker power loader adapted to seed cotton. His total investment is \$2,400, or less than half that of his neighbor. By rotating 7 or 8 of his 10 trailers between the field and the gin he was able to maintain continuous harvesting. This was done by using 2 or 3 trailers for stripping and putting the seed cotton above trailer capacity in field storage. The seed cotton must be handled twice by the grower but reloading from field storage with the hay-stacker requires only 16 man-minutes per bale, Table 6. This grower makes his loader and operator available to his neighbors when they are ginning from field storage. They in turn loan him their trailers, one pickup-truck and operator to pull the trailers to the gin. The grower with the smaller investment in trailers and loader, thus, has large trailer capacity available when ginning from field storage and avoids the investment and depreciation involved in volume facilities. The hay-stacker is also available for other purposes.

Gin Capacity on the High Plains

Mechanical harvesting of cotton in Texas has made its greatest advance in the High Plains area. A revealing index of gin capacity in this area is the number of days of full-run ginning required for the entire crop. The Census Bureau in its surveys of "Cotton Ginning Machinery and Equipment in the United States," for 1940 and 1945, asked each ginner how many bales he could gin in a 12-hour day of full-run. By relating such reported capacity to the size of gins, the number of days to gin the crops for other seasons than 1940 and 1945 can be computed.

Table 4. Daily ginnings by periods, eight High Plains counties, 1949 crop

County	Daily ginnings			
	Nov. 14 through Nov. 30	Dec. 1 through Dec. 12	Dec. 13 through Jan. 15	Jan. 16 to end season (March 20) ¹
	Bales			
Cochran	83	72	44	6
Crosby	85	63	41	4
Dawson	77	61	30	5
Hale	108	82	49	3
Hockley	80	82	30	3
Lamb	101	81	32	2
Lubbock	105	84	37	3
Lynn	98	70	40	5
Average	93	76	36	4

¹Census ginning data is not published for the period between January 16 and March 20.

Table 5. Number of days of full-capacity 24-hour run that would have been required to gin the whole cotton crop of selected High Plains counties

Year	Counties							
	Crosby	Dawson	Floyd	Hale	Lamb	Lubbock	Lynn	Average
	Days							
1937	43	46	30	30	33	45	58	43
1938	20	19	17	14	15	18	21	16
1939	13	17	9	13	16	17	22	18
1940	12	17	13	13	20	14	15	15
1941	28	25	10	18	17	26	25	22
1942	18	34	19	14	14	25	38	24
1943	19	22	19	18	20	26	25	22
1944	14	22	12	14	22	30	33	23
1945	6	3	6	5	3	7	3	4
1946	9	13	18	16	14	20	7	14
1947	34	42	28	36	48	55	37	42
1948	19	23	28	36	31	35	18	27
1949	62	62	56	71	61	67	64	64
1950	24	28	19	39	19	35	34	28
1951	49	19	74	77	40	46	32	48
Average	25	26	24	28	25	31	29	27

Table 5 shows the number of days of full-run 24-hour ginning that would have been required, on an average, for the 1937-51 seasons to gin the cotton of seven cotton-producing counties of the High Plains area. Of special interest are the abnormally large crops of 1937 and 1949, which would have required 43 and 64 days, respectively, of full-capacity 24-hour day ginning. It seems evident that present gin capacity in the High Plains counties is adequate to handle a normal crop in a greatly shortened harvesting period provided full-capacity ginning is attained.

Area of Mechanical Stripping

Most of the mechanical stripping of cotton on the High Plains is done in the area north of the southern boundaries of Cochran, Hockley, Lubbock and Crosby counties. This applies especially to cotton harvested entirely by mechanical strippers. In the area south of this boundary, most of the cotton acreage is usually "pulled over" one or two times by hand before stripping the remaining bolls by machine. The stripping is done after frost has removed the leaves from the plants.

The survey indicated 36 percent of the 1949 crop and 33 percent of the 1950 crop was stripped mechanically. A shortage of machines prevented more of the 1949 crop from being machine stripped. Acreage restrictions and a more plentiful labor supply accounted for the smaller part of the 1950 crop stripped mechanically.

Farm Storage of Seed Cotton

The survey data indicated 23 percent of the 1949 crop was stored in the seed prior to ginning. This varied from 48 percent in

Cochran county to 14 percent in Crosby county. Ninety percent of the storage was in the field, with the remainder in the gin seed-cotton houses at the gin and in farm buildings. There was no storage of consequence in 1950 as most of the seed cotton moved direct from the field to the gin.

Farm storing of mechanically-stripped seed cotton in the High Plains area is of three types: storing in ricks on the ground, storing in out-door pens and storing in barns. Storing in ricks, or piles, involves dumping the seed cotton on a well-drained and cleared part of the field. These ricks are shaped and smoothed for drainage. Ginning is done when facilities are available and the green bolls have opened and dried. One disadvantage of field storage occurs in parts of the area having light sandy soils. The drifting of sand against the ricks causes difficulties in loading for movement to the gin. To prevent this difficulty, growers build the ricks on grass-land or store the seed cotton in pens of picket fence or net wire. It is then possible to remove the drifted sand from the side of the pen, and have access to the seed cotton free of drifts after removal of the pens.

Labor Requirement of Farm Storing

Farm storing of seed cotton requires additional unloading and reloading. The main added cost of storing under practices existing on the High Plains is for labor. It was found that unloading for farm storing required 45 minutes of labor per bale. This is



Figure 1. Unloading machine-stripped seed cotton for field storage, High Plains, 1949.

based on one man ricking the 8 to 13 bales of daily output of a two-row stripper. Many growers merely dump the seed cotton on the ground. Labor requirements for unloading into barns and outside pens were found to be about the same as for ricks. Unloading of seed cotton for outside or barn storing was done from trailers equipped with false net-wire bottoms. These bottoms consisted of two sections of hog-wire spliced length-wise the inside width of the trailer. The length of the spliced section is at least 3 feet longer than the trailer inside length plus the height of the two endgates. Two pieces of 2 x 6-inch planks are bolted together with the end of the spliced wire between. A bridle of chain or steel cable is bolted to this. The false bottom is arranged to cover the bottom and ends of the empty trailer with the excess length hanging over each end. When the trailer is ready for unloading, the endgate opposite the reinforced end of the false bottom is removed, a cable or chain is attached to the bridle and the entire load pulled from the trailer with a tractor.

Requirements in Reloading Seed Cotton

One of four methods is usually followed in loading farm-stored seed cotton into trailers for delivery to the gin: loading by hand with forks, loading with gin-type suction fans, loading with corn or grain conveyers and loading with hay-stackers adapted to seed cotton. Labor requirements, according to method of loading, are shown in Table 6. Loading with hand forks requires 60 minutes per bale. This is based on a loading rate of 2 bales an hour for 2 men, one forking and the other in the trailer when not assisting in loading from the rick. Many trucks have sides too high to permit loading by this method. Loading with a suction-fan requires 30 minutes per bale. This is based on a 2-man crew and a loading rate of 4 bales per hour. Fans were equipped with a screen on the outlet pipe, permitting some small trash and dirt to pass over the side of the trailer as the seed cotton left the discharge pipe. This was not possible with other types of loading methods. Fans are not adaptable to the loading of barn-stored seed cotton. Conveyer loading requires 30 minutes per bale. This is based on a 5-man crew loading 10 bales an hour. Loading with a hay stacker requires 16 minutes per bale. This is based on a 5-man crew and a loading rate of 18 bales an hour. This type of equipment is not suitable for loading barn-stored seed cotton. Many suction-fan loaders that were purchased new and assembled into operating units in machine and sheet

Table 6. Man-hour requirements in loading seed cotton from ricks to trailers

Method of loading	No. of men in crew	No. of bales per hour	Minutes per bale
Hand loading	2	2	60
Suction-fan	2	4	30
Conveyer	5	10	30
Hay-stacker	5	18	16



Figure 2. Loading machine-stripped seed cotton into a trailer from field storage with a conveyer type loader, High Plains, 1949.

metal shops represent as much investment as in the hay-stacker loaders.

With the use of a stripper elevator, the labor required to load seed cotton from the stripper into the trailer is reduced to a minimum. Most cotton growers prefer to deliver their cotton direct from the stripper to the plant for immediate ginning. This avoids the extra labor incident to farm storing. With an increasing shift to mechanical stripping and prolonged favorable weather the rate of stripping may greatly exceed ginning capacity. Growers then can leave the cotton in the field for stripping later than usual, or they can store the seed cotton in the field. Some growers prefer to field-store the crop and seek ginning service later to avoid the congestion at the gin during the peak of the stripping period.

Climatic Factors

In the High Plains cotton area of Texas, the growing season varies from 197 days in the northern section to 217 days in the southern. In the central part, the average date of the first frost is November 4. Census Bureau data show that ginnings by November 1 account for 40 percent of the crop in the southern section, 35 percent in the central and 28 percent in the northern section. With the advent of cold weather, natural defoliation occurs and the opening of the bolls is hastened. A sudden hard freeze will cause the leaves to stick to the plant and not drop off as is possible when a light frost occurs. Acceleration of boll opening may be obtained by chemical defoliation before frost. Defoliation by natural or artificial means leaves the plants in the best condition for stripping.

Weather on the High Plains, 1949-51

Rainfall in 1949 was 50 percent above average, (29 inches at Lubbock) and there was a mild freeze, 24 degrees at Lubbock, on October 31. Ideal weather for conditioning the cotton plants for stripping and later storage in the field, prevailed until all the crop was ginned.

The 1950 growing season was not typical of the High Plains. Much of the dryland area did not receive moisture until too late to plant a cotton crop. When the rains did start they were much above seasonal averages in parts of the area, with summer temperatures below normal. September weather was not conducive to maturity of the cotton crop. The weather in October was satisfactory but the retarded growing conditions in August and September were not overcome. The first freeze occurred on November 4. This freeze was severe, with 17 degrees at Lubbock and 20 at Lamesa. Due to the growing conditions prevailing prior to the termination of the growing season, the cotton plants were not in the proper condition for this severe freeze. A light frost to defoliate the plants, followed by clear and above freezing weather for 10 to 15 days would have been ideal. The freeze of November 4 occurred when the bolls on much of the cotton crop were green and had a high moisture content.

Rainfall in 1951 was below average, (14 inches at Lubbock). The southern section of the High Plains had conditions more drouthy than the northern. In the irrigated parts of the area, a few sections had excessive September rainfall. This, with previous irrigation, adversely affected the yield and quality of the cotton crop. The first freeze occurred on November 1, with a temperature of 31 degrees at Lubbock. On November 2, the temperature dropped to 21 degrees. As much of the crop was planted late, this type of freeze did not condition the plants properly for mechanical stripping. When stripping was underway, dust storms and damp periods frequently interrupted harvesting. This lowered the grades of the unharvested cotton.

Seasonal Operation of Strippers

The 1949 cotton crop of the High Plains exceeded 1,500,000 bales; 1950 production was 712,000 bales and that of 1951 was 1,250,000 bales. With the beginning mechanical stripping on a large scale, the daily rate of harvesting in 1949 and 1951 greatly exceeded the daily capacity of the gins. When the daily rate of stripper harvesting is high, the gin plants usually operate on a 24-hour basis. If ginning capacity is close to the daily rate of stripping, the grower can solve the storage problem by owning trailer capacity equal to his daily harvest. In some sections during the harvest of the 1950 crop, the gins were behind as much as 36 to 48 hours. A small volume of seed cotton was field-stored in 1950, but most farmers merely deferred harvest until their cotton was ginned

and the trailers were again available. This was possible without too much risk with the small acreage and crop of 1950. In 1949, as many as 300,000 bales of seed cotton were stored in the fields at one time. In 1951, possibly 75,000 bales were field-stored awaiting ginning.

Results of Storage, 1949

Three hundred and two samples were collected from out-door, farm-stored seed cotton from the 1949 crop. Fifty-four of these samples were obtained at the time the seed cotton entered storage and the remainder at, or near, the time of ginning from storage stocks. The samples were representative of the counties in which machine-stripped cotton was farm-stored prior to ginning. They were stored as collected and later ginned on a small one-stand gin.

The grades of samples of mechanically stripped, stormproof and open-boll varieties are summarized in Table 7. All the seed cotton samples were stored in sacks for a month or more before ginning. The storage period prior to sampling was 4 to 9 weeks. No rain fell during this period of farm storage. All the cottons sampled in Cochran county were produced under dryland conditions. Eighty-eight percent of these samples were of stormproof varieties and 89 percent of them were harvested on or before the end of the mid-season harvesting period, (November 16 to December 5). Seventy-nine percent of all samples and 86 percent of the stormproof cottons from this county were in the highest grade group. The remaining samples were lower in grade. The growing season in this county is one of the shortest of any major cotton-producing county in the area.

Table 7. Variety, grades and period of harvest of High Plains cotton, 1949

County	Samples	Stormproof varieties	Stripped before Dec. 6	St. low mid., mid. lt. sp. and st. low mid. br. ¹	
				Stormproof varieties	All varieties
	Number	Percent	Percent	Percent	Percent
Bailey	2	100	100	100	100
Cochran	67	88	89	86	79
Crosby	6	33	100	100	83
Dawson	7	57	100	50	57
Hale	80	47	91	66	45
Hockley	50	44	90	45	32
Lamb	20	50	95	80	50
Lubbock	35	37	80	69	57
Lynn	26	4	96		35
Terry	2		100		100
Yoakum	7	86	100	86	86
Total	302				

¹Percent strict low middling, middling light spotted and strict low middling bright.

Growing Season and Gin Capacity, 1949

Most of the cottons sampled in Hale county were from irrigated fields. The length of the growing season is similar to that in Cochran county. Sixty-six percent of the stormproof varieties and 45 percent of all varieties were in the highest grade group. Forty-seven percent of all cotton sampled in this county was from stormproof varieties.

Growers in areas with the shortest growing season and the lowest gin capacity practice farm storing of seed cotton to the greatest extent. Farm storage of machine-stripped seed cotton was most prevalent in Cochran and Hale counties following the 1949 harvest. On a representative farm in Cochran county, 700 bales were machine stripped from October 18 to November 17. A light frost occurred October 10, which removed some of the leaves from the plants. The first severe frost was on October 31. This crop was stored for 9 weeks in 10 large piles. Samples from this seed cotton at the time of ginning averaged slightly above strict low middling. This was the highest grade obtained from any farm sampled.

Factors Related to Quality, 1949

Cottons which gave the highest grades were grown on sandy and sand loam soils. Seventy-one percent of the strict low middling bright grades and 49 percent of the strict low middling grades were produced on such soils.

Sixty-three percent of the samples from defoliated fields were in the highest grade group. The proportion of samples from such fields was low, 6 percent. The use of chemical defoliants was helpful, but not essential, to effective mechanical stripping of cotton under conditions prevailing on the High Plains during 1949.

Results of Storage, 1950

One hundred forty-seven samples of seed cotton were collected from the crop of 1950; 105 of these were of the stormproof varieties, mechanically stripped. Less than 10 percent was held in storage between the time of stripping and ginning. The remainder was ginned directly from the field. In the parts of the area in which the bolls matured adequately during 1950, the grade and character of the lint cotton were satisfactory. In such instances, 78 percent of the field-stored cotton was in the higher grade category (middling light spotted, strict low middling, strict low middling plus). Fifty-four percent of the stormproof cottons of the adequately-matured category not field-stored were in the high grade bracket. This does not imply that field storage resulted in significantly higher grades. It is the only comparison available. All the field-stored cotton was from one irrigated farm on which the crop was well matured. The cottons not field-stored before ginning were from irrigated and

dry-land farms on which the crops were also well matured. There is evidence that the storage of mechanically stripped seed cotton prior to ginning conditions it for more effective ginning. There was no precipitation during the period of field storage of the 1950 crop.

Results of Storage, 1951

One hundred seventy-seven samples of seed cotton were collected from the crop of 1951. Sixty-five of these were from trailers at the time of harvest and 104 were from field storage at or near the time of removal from storage. The remainder was stored in barns or gin seed-cotton houses. Seventy-six percent of all samples from field storage were low middling equivalent or better in grade; 69 percent of samples from trailers were in the same group. The remaining samples were lower in grade. Hale county had a somewhat smaller proportion of the cottons from field storage in the high grade bracket. This is due to most of the field-stored cotton originating in the northwest part of the county. The growing season there is not as favorable for the production of desirable grades as in the southern part, from which most of the trailer samples originated. In Lubbock county, a much larger proportion of the higher grades came from the field-stored samples. Some of the samples from trailers were from farms which had unfavorable growing conditions. This produced lower grades. Samples from field-stored seed cotton receiving one inch of moisture when in storage during the first week in January 1952 were of satisfactory grade. They compared favorably with samples from seed cotton stored under cover at the time of harvest.

In a test conducted at Substation No. 8, Texas Agricultural Experiment Station, Lubbock, the results of field storage of mechanically harvested seed cotton under 50 percent above average precipitation during December, January and February were excellent. Two inches of moisture in two artificial applications, in addition to one inch in the form of rain, snow and ice were received by the test seed cotton between November 28 and January 9. Grade was not lowered enough to justify the cost of protection from the weather. Some weather damage to field-stored seed cotton could be expected to occur on the High Plains in an exceptional fall. Cloudy weather and intermittent rains for a week or more could bring about such damage. The possibility of occurrence is once or twice in 10 years, and then only in parts of the area.

Conclusions

Year by year, an increasing portion of the cotton on the High Plains is being stripped mechanically. In the large crop year of 1949, 35 to 40 percent of the crop was mechanically stripped. This percentage is expected to increase. This type of harvest is adapted to the climate of the area. A large part of the crop is still unharvested at the time frost kills and removes the leaves from the cotton plants each fall.

At this time each year, when production is normal or above, the cotton can be stripped at a daily rate much above the ginning capacity of the area. Growers have two choices—they can leave the cotton in the field for harvesting later than usual, or they can store the seed cotton in the field. Most of the cotton growers of the High Plains in 1949 and 1951 chose full-scale stripping and farm storage of the surplus. Perhaps as much as 90 percent of the storage was on the ground in the cotton fields.

Field storage of mechanically stripped seed cotton is a satisfactory method of adapting ginning capacity to mechanical harvesting on the High Plains. Field-stored seed cotton received no precipitation of consequence during the storage of the 1949 and 1950 crops. In January 1952, field-stored seed cotton of the 1951 crop was subjected to 1 inch of moisture in a period of less than a week. Seed cotton stored under similar conditions on the Lubbock Experiment Station and wet artificially with 2 additional inches of moisture resulted in no decline in grade.

In the Gulf Coast area storage must be under cover.

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The master thesis, "Storing as an Aid to More Efficient Ginning of Mechanically Harvested Seed Cotton," by Thomas M. Stubblefield, June 1951, was the main source of information dealing with the operation of seed-cotton houses on gin yards.

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